PATENT SPECIFICATION

NO DRAWINGS

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COMPLETE SPECIFICATION

Ingredient for Poultry Feed

I GEORGE DEWEY LACKEY, JR., of Apartado 410, Guernavaca, Morelos, Mexico, a citizen of the United States of America, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates in general to pigmentation agents for poultry and eggs and in particular to a powdered pigmentation agent made from flower petals containing xanthophyll.

In the poultry and egg industry, which is reaching proportions far beyond the expectations of the pioneers, the stage has been reached where scientific research and application of new discoveries, methods and compounds are absolutely essential in order to meet the increasing competition. It is no longer a hit or miss industry engaged in by any or all farmers or poultrymen or inexperienced newcomers desiring to supplement their income by selling chickens and eggs.

Exclusive of equipment, the initial cost of hatching eggs, or baby chicks, as well as the cost of feed to raise chicks to marketing stage or to an age for production of eggs are factors to be carefully watched and considered when operating a poultry enterprise. Further, of utmost importance, the quality and acceptance of the eggs and poultry meat produced must be maintained at a high level to be marketed to a successful advantage in face of competition.

Because of consumer preference for poultry meat and eggs having an appreciable amount of yellow pigmentation the poultry industry is constantly striving to produce poultry meat and eggs having the best possible yellow pigmentation. Many different means have been employed to provide this desired pigmentation. Natural ingredients of poultry feeds such as yellow corn and alfalfa provide certain degrees of pigmentation in finished poultry and eggs, however the optimum level of pigmentation in the finished poultry and eggs cannot be obtained by only the use of these ingredients as the sole source of pigmenting factor at the levels at which these ingredients are feasible to be used. Also there are times when, because of economy or availability, it is desirable to use ingredients in producing poultry feed other than those that are common sources of the pigmenting factor. The goal, therefore, is to obtain a low cost compound or ingredient for poultry feed that can be readily available and that has high pigmentation characteristics from which a high degree of pigmentation will be carried forth through digestion to the finished poultry and eggs.

Varied and expensive compounds, natural and synthetic, have been used to obtain increased pigmentation in poultry and eggs. One fact has been established by the prior art. That is that xanthophyll, a natural plant pigment, is the substance which is needed in the diet of poultry to provide the desired yellow pigmentation of the skin and fat of finished poultry and the yolks of eggs.

Xanthophyll is present in varying degrees in a great deal of vegetation found in nature. The many different feeds used in the poultry industry vary widely in their content of this pigmentation factor. The goal of all feed manufacturers and poultrymen is to provide a feed with sufficient xanthophyll to produce finished poultry and eggs with a high level of pigmentation that will be readily acceptable to the buying public.

Although certain materials used as ingredients of poultry feed may be good sources of xanthophyll they are apt to be expensive, in inadequate supply, or of a nature to require excessive levels to be used for supplying desired pigmentation, thus resulting in a lack

[*Price 4s. 6d.*]

of efficiency of poultry converting feed to meat or eggs to the best advantage economically. Conversely to the latter point, many feeds, while providing optimum levels of growth ingredients, do not contain xanthophyll in sufficient quantities to provide the desired yellow pigmentation of finished poultry and yolks of eggs.

Processes involving the transformation of various plants and vegetation into materials containing high levels of xanthophyll have been used.

However, I have found a means by which the relatively high cost of producing the desired pigmentation can be reduced to commercial needs; and in accordance with the present invention a feed for poultry comprises a basic growth food having an addition of xanthophyll-containing powdered material produced from the xanthophyll-containing petals of flowers which range in colour from yellow to deep orange, the addition being in sufficient quantity to provide xanthophyll serving to produce the required pigmentation.

Preferably, the additive material is in sufficient quantity to provide xanthophyll in an amount from ten to eighty grams of xanthophyll per short ton of feed. Any xanthophyll initially contained in the feed before the addition of the powdered material may be counted in the total xanthophyll content of the feed.

The invention also comprises a xanthophyll-containing pigmentation agent for addition to a basic growth food and when produced in powder form from the petals of flowers which range in colour from yellow to deep orange.

Preferably the flower petals used for this invention are those of Tagetes or of the marigold family.

Such feed materials may be different in different parts of the world, yet when they have my pigmentation agent combined with them, the resulting feed will provide consistently and uniformly a very desirable level of pigmentation of the skin and fat tissues of the birds consuming the feed, and of the yolks of the eggs produced by birds consuming the feed, such desired results being obtained at a low cost from the use of my pigmentation agent.

One important advantage of using my pigmentation agent is that other ingredients of the basic feed for poultry can be varied considerably depending on availability, market conditions and prices, season, location and countless other factors, the object, of course, being to use the least expensive ingredients consistent with satisfactory growth results, as for instance, milo maize, kaifer corn, white corn, instead of other items that may be in short supply or available at a disadvantage economically.

This provides for flexibility in feed formulation, and it may well be that greater efficiency of conversion of feed to meat or eggs may be attained. For example, with other ingredients not high in xanthophyll content being used in combination with alfalfa as the only source of xanthophyll, the level at which alfalfa must be used to produce the desired results in pigmentation of the finished poultry and the yolks of eggs may be as high as 10% of the total feed. Alfalfa is not known to contain factors contributing to the fast growth of poultry; to the contrary, there is evidence that indicates that when alfalfa is used at this high a level it actually proves to be a growth retardant. Consequently, by using my pigmentation agent at a relatively low level instead of other agents that require use at much higher levels for pigmentation benefits, greater variations of known growth promoting ingredients may be utilized, thus obviously resulting in improved efficiency of converting feed to meat or eggs.

It has been found that the petals of the flower of the Marigold family has an extremely high xanthophyll content and it is believed that with further experimentation it will be found that all flowers with petals ranging in colour from yellow to deep orange will be suitable for use in producing a powdered pigmentation agent high in xanthophyll content. However, the marigold is quite plentiful and easily grown with little or no special attention and also it is easily grown at almost any altitude and in almost all climates, thus the marigold serves admirably as a plentiful source for the herein described pigmentation agent.

In the process the flower is harvested and dried either naturally or artificially in any manner known to the art. The petals are then separated from the other flower components, the petals being ground into a powder which has the excellent properties of being readily and easily mixed with other ingredients in the production of a complete poultry feed. The ground petals in a powdered form present an ingredient that is neither hygroscopic nor electrostatic.

The above process can as well be reversed with the petals of the flower being separated from the other components of the flower as soon as the flower is harvested and then dried separately for the final steps in the production of the finished item. Also the entire flower head including the seeds can be ground after drying to produce a satisfactory feed ingredient.

The xanthophyll value of flower petal meal made from yellow marigolds in terms of B Carotene is equivalent to 17,000 mcg/g in materials tested thus far, and it is probable that this level will be found even higher as better varieties are selected and separation

procedures of petals become more refined.

In feeding trials with broiler type chicks using higher than necessary levels of my pigmentation agent to provoke pigmentation no adverse effect was observed on either growth or feed conversion. Thus it has been proven that the item is completely palatable and in no way does it interfere with normal growth of poultry even when used in amounts excessive of the required level for providing the desired results. Excellent skin and fat pigmentation was achieved when using my pigmentation agent as the only dietary source of xanthophyll, and when used at lesser levels in combination with other ingredients containing xanthophyll it was found that the results were accumulative. Thus it has been proven that when my invention is used in combination with other sources of xanthophyll its use enhances the pigmentation benefits of such other ingredients. It is emphasized, however, that other sources of pigmentation are not necessary when my invention is properly employed as it alone does provide the desired pigmentation in both finished poultry and yolks of eggs.

That rather small quantities of this material are adequate to provoke desirable egg yolk coloring was demonstrated in a trial in which laying hens were first fed a pigment free diet. Within four weeks all birds were laying eggs with yolks that were almost completely white, these corresponding to a visual score of "2" on the Heiman Carver egg yolk rotor. To this depletion diet were added Tagetes flower petals at two different levels, this diet then being fed to hens that had previously been on the pigment free diet. Also included in the test were diets free of pigmentation containing ingredients to which were added two different levels of alfalfa, others to which were added two levels of achiote. In the same formula the following xanthophyll containing ingredients were substituted for ingredients containing no xanthophyll: red milo, yellow milo, criollo corn, yellow corn, and a combination of yellow corn and alfalfa. The egg yolk pigmentations obtained within two weeks and continuing as long as the diets were fed are shown in the accompanying table.

Treatment	Egg Yolk Pigmentation Index (Heiman-Carver)
(1) Pigment Depletion Diet	2
(2) Pigment Depletion Diet Plus 0.125% Tagetes	14
(3) Pigment Depletion Diet Plus 0.250% Tagetes	16
(4) Pigment Depletion Diet Plus 2.5% Alfala	10
(5) Pigment Depletion Diet Plus 5.0% Alfalfa	11
(6) Pigment Depletion Diet Plus 0.5% Achiote	7
(7) Pigment Depletion Diet 1.0% Achiote	10
(8) Yellow Corn Diet	11
(9) Yellow Corn Diet Plus 2.5% Alfalfa	16
(10) Criollo Corn Diet	4
(11) Yellow Milo Maize Diet	5
(12) Red Milo Maize Diet	5

In these tests the materials identified as "Tagetes" were obtained by pulverizing petals of common varieties of Marigold flowers that are easily available. It is perfectly apparent that the flower petal was effective in provoking yellow pigmentation of egg yolks to a very high degree while the material was used at a relatively low level. Calculating the concentrations of xanthophyll at the level of 17,000 mcg/g, these results are in agreement with generally accepted requirements of from 10,000 to 12,000 mcg/lb of feed necessary to give adequate pigmentation. It must be pointed out that this pigmentation was caused by the material of the flower petal alone. Obviously when used to augment other ingredients which have some but not sufficient content of xanthophyll the result would be even more desirable, or lesser quantities of the material could be used to obtain the same results as are herein cited.

From the foregoing it will be seen that I have provided a new method of obtaining xanthophyll and making it available as an ingredient of feed for poultry so that when feed containing the material cited is provided for poultry it provokes yellow pigmentation in the skin and fat of the poultry and of the egg yolks produced by the poultry, such results being both consistent and uniform, and that the material is available in sufficiently low cost to make it commercially feasible.

WHAT I CLAIM IS:—

1. A feed for poultry comprising a basic growth food having an addition of xanthophyll-containing powdered material produced from the xanthophyll-containing petals of flowers which range in colour from yellow to deep orange, the addition being in sufficient quantity to provide xanthophyll serving to produce the required pigmentation.

2. A feed for poultry according to claim

1 in which the additive material is in sufficient quantity to provide xanthophyll in an amount of from ten to eighty grams of xanthophyll per ton of feed.

3. A xanthophyll-containing pigmentation agent when supplied for addition to a basic growth food in accordance with claim 1 and when produced in powder form from the xanthophyll-containing petals of flowers which range in colour from yellow to deep orange.

4. The pigmentation agent according to claim 3 in which the flowers are of the genus Tagetee.

5. The pigmentation agent according to claim 3 in which the flowers are of the marigold family.

6. The feed according to claim 1 or claim 2 in which any xanthophyll contained in the feed before addition of the xanthophyll-containing powdered ingredient is counted in the total xanthophyll content of the feed.

7. A feed for poultry, containing addition of a powdered xanthophyll-containing ingredient, substantially as described herein.

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